

Before the
FEDERAL COMMUNICATIONS COMMISSION
 Washington DC 20554

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In the Matter of)
)
Sierra Digital Communications, Inc.)
)
Petition for Rule Making to Accommodate)
Point-to-Point Operations in the 24 GHz Band)
Under Part 15 of the Commission's Rules)

RM-_____

PETITION FOR RULE MAKING

Pursuant to Section 1.401 of the Rules, Sierra Digital Communications, Inc. ("Sierra") requests that the Commission amend Section 15.249, in the manner described below.

A. Proposed Rule Change

The Commission's Rules limit field strength in the 24.00-24.25 GHz band to 250 mv/m,^{1/} except that field disturbance sensors in the central 100 MHz of the band, from 24.075 to 24.175 GHz, are permitted to operate at 2500 mv/m.^{2/}

Sierra requests a rule change to permit the certification of equipment for point-to-point operations across the 24.00-24.25 GHz band at 2500 mv/m, provided the antenna gain is at least 33 dB. That proposed minimum gain corresponds to a beamwidth of 3.5 degrees, and will ensure that emissions outside the beam are far below the current limits. Suggested language to accomplish this change is the Appendix.

The proposed change is in the public interest because it will make Part 15 regulation available for equipment that provides short-range point-to-point services in the 24 GHz band. This will help to relieve both the public and the Commission of the costs, delays, and

^{1/} 47 C.F.R. § 15.249(a). All references to field strength are at 3 meters.

^{2/} 47 C.F.R. § 15.245(b).

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inefficiencies of the traditional licensing process, under circumstances where licensing is unnecessary to prevent interference. As shown in detail below, the rule change will not result in increased interference to other services.

B. Proposed Conditions on 24 GHz Point-to-Point Operation

The proposed rule incorporates the following conditions:^{3/}

- Operations must be point-to-point fixed.
- Antenna gain must be at least 33 dBi. At antenna gains over 33 dBi, power must be reduced to maintain a maximum field strength of 2500 mv/m.
- Antenna connections must comply with Section 15.203 to prevent end users from substituting higher-gain antennas.
- Peak emission limits are unchanged at 2500 mv/m.^{4/}
- Out-of-band emissions limits are unchanged.
- Frequency stability must be 0.003% or better, to provide added protection to adjacent bands. (The Commission's Rules do not otherwise impose a stability specification in this band.)

C. Negligible Added Potential for Interference

The added potential for interference under the requested rule change is negligible. The output power needed to produce 2500 mv/m from a 33 dB antenna is **less than 1 milliwatt**, which is insignificant relative to the powers authorized for other uses of the band. Those users are:

^{3/} Additional conditions to address concerns raised by the amateur radio community are discussed below.

^{4/} Section 15.249(d) sets the maximum *average* emission at 250 mv/m, and permits peak emissions to exceed that average by 20 dB, or to 2500 mv/m. The rule change would leave the peak limit unchanged.

government radiolocation, presumably radar operations at substantial power;^{2/}

private radiolocation, with no fixed power limit;^{6/}

amateur operations, with a peak envelope power of 1,500 watts;^{7/} and

Part 15 operations, including field disturbance sensors in the middle of the band at 2500 mv/m.^{8/} (These typically use antennas with a gain of about 10 dB, producing a moderately wide dispersion pattern of 45 degrees or so. A field disturbance sensor using a 10 dB antenna can employ an output power of almost 0.2 watts — 200 times the output power requested here — and still meet the Commission's limits.)

All of these applications, moreover, must accept interference from ISM applications, which are authorized to operate at unlimited power.^{9/}

The rule requested here actually reduces the area over which harmful interference might occur.^{10/} The proposal thus satisfies the condition the Commission adopted earlier this year when it changed the rule governing power vs. antenna gain for fixed, point-to-point, spread spectrum

^{2/} 47 C.F.R. § 2.106.

^{6/} See 47 C.F.R. § 90.205(m) ("Requested transmitter power will be considered and authorized on a case by case basis.")

^{7/} 47 C.F.R. § 97.313(b) (1.2cm band). Although amateur operators do not currently employ 1.5 kW in this band, there is no regulatory barrier to their using any power up to that limit.

^{8/} 47 C.F.R. § 15.245.

^{9/} 47 C.F.R. § 18.305(a).

^{10/} Comparing directional operation at 2500 mv/m (proposed rule) and omnidirectional operation at 250 mv/m (present rule), the areas subject to harmful interference are equal if the directional beamwidth is 3.6 degrees. (This result is independent of the signal strength specified for the harmful-interference contour.) With a directional antenna gain of 33 dBi, as proposed here, the beamwidth is 3.5 degrees, and the area subject to harmful interference is smaller than it is under the present rule.

transmitters in the 2400-2483.5 MHz band. As discussed in more detail below, the Commission required such transmitters to reduce power by 1 dB for each 3 dB that the antenna gain exceeds 6 dBi. The Commission reasoned, "This action will ensure that the area over which harmful interference can occur is equivalent to what would be caused by a spread spectrum system employing an omnidirectional antenna and operating at the [then] current maximum EIRP of 6 dBW."^{11/} The rule proposed here protects users sharing the band in exactly the same way, by containing the area over which they may be subject to harmful interference to an extent no greater than at present.

In any event, the only operations with any realistic chance of being affected by the proposed rule are those under Part 15 and possibly amateur satellite operations — although, as discussed below, even in those cases the likelihood of actual harmful interference is extremely remote.

Part 15 Operations. Part 15 equipment is necessarily designed to be robust. By law it must accept any interference that comes its way,^{12/} and so should be able to tolerate any small increment of interference that results from the rule change. But even that small increment is extremely unlikely, for two reasons. First, as noted above, the maximum peak power is unaffected by the proposal. Second, the requirement of 33 dB antenna gain will limit the requested field strength to a very narrow beam of 3.5 degrees, or less than 1% of the circle around the transmitter. The radiated field will be orders of magnitude below even the present

^{11/} Spread Spectrum Transmitters, 7 C.R. 534, 541 (1997).

^{12/} 47 C.F.R. § 15.5(b).

limit of 250 mv/m over the rest of the circle. The chance of any particular Part 15 receiver being affected by equipment operating under the proposed rule is thus extremely remote.

In short, interference to Part 15 devices is not a realistic threat.

Amateur Radio Operations. Sierra understands that the 24.00-24.05 GHz sub-band is included in the uplink and downlink capabilities of the Phase 3D amateur satellite. ARRL has expressed concern about the possibility of interference in that sub-band, especially to downlink communications.^{13/}

In view of the highly directional nature of signals under the proposal, Sierra doubts the likelihood of actual harmful interference even to satellite operations. Nonetheless, to accommodate ARRL's concerns, Sierra would not object to the Commission's adding these additional conditions:

- Equipment manufactured under the proposed rule must be tunable in the field.
- Point-to-point users must first employ frequencies at 24.05-24.25 GHz, and may tune into the 24.00-24.05 GHz sub-band only if all other frequencies are in use or otherwise unavailable.^{14/}

Moreover, Section 15.5(c) requires a Part 15 user that interferes with an authorized service to cease operations. Although Sierra is confident this provision will never have to be invoked, it would nonetheless afford amateur radio licensees full protection against any interference resulting from the rule change.

^{13/} Letter from Christopher D. Imlay, Counsel for ARRL, to Mitchell Lazarus (April 16, 1997).

^{14/} The Commission has previously used the equipment authorization process to impose requirements on end users. See 47 C.F.R. § 15.247(b)(3)(iii).

Finally, Sierra notes that the present rules can be far more threatening to amateur operations than the proposed rule will be. The present limit of 250 mv/m is measured over a minimum bandwidth of 1 MHz.^{15/} By using broadband equipment, a manufacturer could lawfully pump energies into the band far in excess of those requested here. For this reason alone, the proposal will not significantly increase the potential for interference to amateur operations. In any event, as explained above, the area subject to interference will be reduced under the proposed rule.

D. Public Interest in the Proposed Rule

The proposal outlined here will serve the public interest by reducing the cost and delay of initiating some short-range communications links, without causing appreciable interference to other services. In particular, the proposed rule will permit some facilities that presently must be licensed under Part 101 instead to be regulated under Part 15, and hence to avoid the expenses, delays, and inefficiencies that attend the licensing process.

Compared with traditional licensing, the Part 15 regime offers clear benefits to both the public and the Commission. Because only the equipment is regulated, not the service itself, innovations can reach the marketplace quickly. Certification of a new device to offer a new service typically takes just a few weeks, in contrast with the minimum of a year or two for a rulemaking to authorize a new licensed service. Part 15 users can deploy facilities as fast as their needs arise, without having to wait weeks for frequency coordination and application processing. Moreover, just as in the case of auctioned spectrum, the Commission is spared the burdens of granting and renewing licenses and adjudicating disputes among licensees. All of these benefits

^{15/} 47 C.F.R. § 15.35(b).

come from the shared use of spectrum that is simultaneously available for higher-powered licensed services.

E. Precedent for the Proposed Rule

The concept of permitting highly directional point-to-point operations under Part 15 is not a new one. Indeed, the amendment requested here is very similar in principle to a rule recently adopted in ET Docket No. 96-8.^{16/} That proceeding eliminated the limit on directional antenna gain for non-consumer, fixed, point-to-point spread spectrum operations in the 5725-5850 MHz band, providing for effectively unlimited EIRP.^{17/} (In contrast, the change proposed here continues to limit EIRP, even for high antenna gains.) Docket No. 96-8 also greatly eased the restrictions on antenna gain in the 2400-2483.5 MHz band.^{18/} The Report and Order explained:

The Commission recognizes the advantages of being able readily to establish radio links capable of transmission distances of 10 km, or greater, without the delays and costs associated with formal frequency coordination and licensing. The ability to establish quickly such transmission links could be critical in emergency situations. Directional antennas can significantly reduce the potential for harmful interference to other radio operations in cases where the location of the directional systems is coordinated and there is a low preponderance of mobile systems.^{19/}

Exactly the same considerations apply to point-to-point operations in the 24 GHz band, which is more suitable to some applications than the lower-frequency ISM bands. Specifically, the

^{16/} Spread Spectrum Transmitters, 7 C.R. 534 (1997).

^{17/} 47 C.F.R. § 15.247(b)(3).

^{18/} Id. In the 2400-2483.5 MHz band, power must be reduced by only 1 dB for each 3 dB by which the antenna gain exceed 6 dBi. In the 5725-5850 MHz band, increases in antenna gain do not incur any penalties in power.

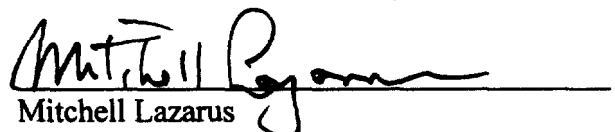
^{19/} Spread Spectrum Transmitters, 7 C.R. at 539 (footnotes omitted).

proposed rule change will achieve the same public-interest benefits of increasing administrative efficiency and reducing unproductive costs and delays, without significantly increasing the potential for harmful interference to other users. The Commission should grant this Petition for the same reasons that it changed the spread spectrum rules in ET Docket No. 96-8.

CONCLUSION

A grant of the requested Petition for Rule Making will benefit the public by expanding the range of services that can be regulated under Part 15 to include certain short-range point-to-point applications. This will provide efficiencies and reduce costs to users of these services, and will promote administrative efficiency by reducing the demand for licensing under Part 101. There will be negligible increase in the potential for interference to other services sharing the band.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Mitchell Lazarus", is written over a horizontal line.

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September 29, 1997.

APPENDIX

Sierra proposes the following rule language. (Deletions from the present rule are shown struck out; additions are shown in double underline.)

§15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

(a) Except as provided in paragraph (b), ~~The~~ field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(b) Point-to point fixed operation is permitted in the 24.0-24.25 GHz band subject to the following conditions:

(1) Fundamental field strength may not exceed 2500 millivolts/meter. Harmonic field strength may not exceed 25.0 millivolts/meter.

(2) Frequency stability must be 0.003% or better.

(3) Antenna gain must be at least 33 dB. At antenna gains over 33 dB, power must be reduced to maintain a maximum field strength of 2500 millivolts/meter.

(4) Antenna connections must comply with Section 15.203.

(c) ~~(b)~~ Field strength limits are specified at a distance of 3 meters.

(d) ~~(e)~~ Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(e) ~~(d)~~ As shown in §15.35(b), for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b), peak field strength may not exceed 2500 millivolts/meter.

(f) ~~(e)~~ Parties considering the manufacture, importation, marketing or operation of equipment under this section should also note the requirement in §15.37(d).

CERTIFICATE OF SERVICE

I, Mitchell Lazarus, do hereby certify that on this 29th day of September, 1997, I have caused copies of the foregoing Petition for Rule Making by Sierra Digital Communications, Inc. to be served by hand upon the following, except that those marked with an asterisk were served via first-class mail:

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